

QUERCUS MUTABILIS IN THE ¹BIG OAK TREE STATE PARK OF MISSOURI

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MORPHOLOGY OF ²MIQUORIA ⁶ECOTYPES

CHARACTER	QUERCUS PALUSTRIS	QUERCUS MUTABILIS	QUERCUS SHUMARDII
<u>Leaves</u> (glabrous above; axillary tufts of rusty hairs beneath):			
Length.....	7.5-11 cm.	4.2-14 cm.	9-17 cm.
Width.....	4.5-8.5 cm.	2.5-11 cm.	5.5-12 cm.
No. of pairs of lateral lobes.....	2-3	2-3	Usually 3
Change in width of the second (and largest) lobe from the sinuses toward the apex or lobules	Constant; lobed and toothed	Narrower; entire or toothed with very small lob- ules	Broader; lobed and toothed
Shape of base.....	Acute or obtuse	Truncate, broadly rounded or obtuse	Truncate or obtuse
Average length of long- est bristle.....	5 mm.	6 mm.	4 mm.
Color of midrib.....	Tawny or pale	Yellow	Pale yellow
<u>Petioles</u> (glabrous):			
Length.....	1.5-5.5 cm.	2-5 cm.	3-6 cm.
<u>Acorns</u> :			
Length of peduncle.....	4 mm.	0-5 mm.	8 mm.
Length of acorn.....	10-16 mm.	15-22 mm.	19-30 mm.
Outside height of cup..	4-5 mm.	8-12 mm.	10-14 mm.
Width of cup.....	13-15 mm.	15-20 mm.	19-24 mm.
Cup-scales (closely ap- pressed).....	Small, smooth, light gray- ish brown	Large, smooth, grayish brown or silvery- gray	Large, tu- berculate, grayish brown some- times tinged with orange
<u>Terminal Winter Buds</u> :			
Length.....	5-7 mm.	3-5 mm.	5.5-8 mm.
Shape.....	Conic, slightly angled, cil- iate on the imbricated scale mar- gins	Ovoid, subterete, glabrous	Conic, slightly angled, pu- berulous or glabrous

Quercus mutabilis, the hybrid of the Pin Oak palustris and the Shumard Oak shumardii, was originally described by Palmer and Steyermark in 1935 in Vol. 22, P. 521, of the Annals of the Missouri Botanical Garden from a tree at Monteith Jct., Bates Co., Missouri. The brief description stated that it was intermediate in foliage and fruit between palustris and shumardii var. schneckii, its parents.

In his monograph "Hybrid Oaks of North America" (A.A.J. 29:35; 1948) E. J. Palmer stated that the leaves and fruit of this type tree resembled shumardii but that the leaves of some other specimens of their collection resembled palustris. He expressed the opinion that it is impracticable to distinguish which variety of a species is involved in a hybrid. Accordingly, the trees in Miquoria, hybrids of palustris and the type species shumardii, growing nearby, should be regarded as mutabilis. In this article Palmer cited localities in four counties in Missouri where mutabilis had been found. Mississippi is a fifth county. The ranges of palustris and shumardii overlap in ten other states, but no specimens of the hybrid mutabilis have been reported outside Missouri.

The A.F.A. champion mutabilis in Miquoria, with a circumference of 10'9" and rising to a height of 131' (as measured in 1955), is a most impressive tree, carrying a greater height in proportion to its girth than any other American Oak. It survived two tornadoes in 1957.

A dendrologist casting his eyes for the first time upon these magnificent specimens of mutabilis, with smooth bark exactly like palustris and deeply lobed leaves resembling palustris, can hardly believe that they are anything but palustris. But the careful morphological study at the beginning of this article shows that they are quite different.

It should not be taken for granted that it is an easy matter to distinguish between the ecotypes of palustris and shumardii. The bark of shumardii is only slightly rough and the ridges are almost obscure. Its leaves are always deeply lobed and look much like palustris when viewed from the ground in their lofty crowns. The ecotype of palustris does not develop the "pins" and drooping branches generally characteristic of the species.

Examination of leaves in the field shows that the second lobe of the leaves of mutabilis narrows toward the apex and is often entire, whereas the lobe of palustris is constant in width and always (or nearly always) lobed and toothed. The leaf of mutabilis is broader at the base than palustris and more like shumardii. The midrib of mutabilis is yellow, resembling shumardii, whereas the midrib of palustris is tawny or pale.

The acorns of palustris and shumardii are very different in size and shape, and this fortunate fact provides a prominent morphological basis for distinguishing the acorns of mutabilis, which are intermediate between its parents. At the same time the acorns of different specimens of mutabilis vary greatly in their characters. There are at least three distinct types. One type has silvery-gray scales, a striking character not appearing in either of its parents.

Where the winter buds of the parents are distinctly different, the characters of the winter buds of the hybrid may be expected to be more or less intermediate and give a

distinct clue to the parents. But in mutabilis this organ fails. The winter buds of palustris and shumardii are not very different, both being conic and acute or acuminate; but the typical buds of mutabilis are smaller, plump, rather blunt, and quite glabrous.

In Crataegus, where the growth rates of different series vary as much as tenfold, the growth rates of species believed to have originated as hybrids between species of different series provide a valuable clue to the parentage when compared with the growth rates of the putative parents.⁴ But in mutabilis this test fails. An 8 year record of the growth rate of the champion mutabilis shows it grows at a substantially slower rate than either palustris or shumardii, as shown in the following table:

GROWTH RATE OF THE LARGEST OAK OF EACH KIND IN MIQUORIA

TAXON	CIRCUM- FERENCE	HEIGHT	AVERAGE ANNUAL INCREMENT OF CIRCUMFERENCE Inches	LENGTH OF RECORD Growing Years
<i>Quercus</i> sp.				
<i>lyrata</i>	11'9"	.....	.75	8
<i>macrocarpa</i>	17'7"	127'	.6	4
<i>michauxii</i>	19'9"	.....	1.1	8
<i>palustris</i>	13'4"	.....	1.26	13.7
<i>mutabilis</i>	10'9"	131'	.75	8
<i>shumardii</i>	12'9"	.....	1.5	6
<i>falcata pagodaefolia</i> ..	11'9"	104'	1.2	11
<i>falcata leucophylla</i> ...	14'4"	122'	2.5	6

Mutabilis is distributed thruout the NE¹ of Section 14, being a constituent of the "Upper Mississippian Forest" type, but does not grow in the low bottoms. It seems to be more common than either of its parents. It is impossible to say how much farther its natural range may have extended, as all other timber in the Mississippi River bottoms has been destroyed, but it seems reasonable to assume that it ranged outside the present park.

The possibility of a relationship between mutabilis and Q. nuttallii cachensis Palmer of northeastern Arkansas deserves future investigation. The acorns of the champion mutabilis look very much like a picture of the acorns of nuttallii cachensis; but there seems to be a difference in the largest lobe of the leaves. Nuttallii does not grow in Miquoria and it is questionable whether it is found anywhere in Missouri.

¹In Mississippi Co., Missouri near the Mississippi River; described in PHYTOLOGIA, Vol. 4, No. 3, Pp. 154-155. It is the only locality in the United States outside New England and eastern New York that is within fifty miles of four other states.

²"MIQUORIA" is a name coined by the author to take the place of "Big Oak Tree State Park," being brief, euphonious and descriptive. It is made up as follows: MI from Mississippi Co. and River; QU from Quercus; ORIA from Hicoria.

- ³The country people and retired lumbermen--unconcerned over the perplexities of taxonomy--call palustris, mutabilis and shumardii "water Oak." The true Water Oak, however, does not range so far up the Mississippi River.
- ⁴Cf. "Manual of the Hawthorns of Cook and Du Page Counties of Illinois" by Kendall Laughlin, Pp. 13, 17, 56, 57.
- ⁵"A Classification of Midwest Forest Types" by Kendall Laughlin; Trees Magazine July-Aug. 1952.
- ⁶"Ecotype" emphasizes the distinctive characters developed in a taxon by modification of its genotype in response to a more or less peculiar environment. The word has significance here because Miquoria is a climax forest.



QUERCUS PALUSTRIS



QUERCUS MUTABILIS



QUERCUS SHUMARDII

29% of natural size